

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE J		PAGE OF PAGES 1 2	
2. AMENDMENT/MODIFICATION NO. 0001		3. EFFECTIVE DATE 19-Jul-2004		4. REQUISITION/PURCHASE REQ. NO. W807PM-4153-2502		5. PROJECT NO.(If applicable)	
6. ISSUED BY VBURG CONSOL CONTRACTING OFC 4155 CLAY ST VICKSBURG MS 39183-3435		CODE W912EE		7. ADMINISTERED BY (If other than item 6) See Item 6		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)				<input checked="" type="checkbox"/> 9A. AMENDMENT OF SOLICITATION NO. W912EE-04-B-0016			
				<input checked="" type="checkbox"/> 9B. DATED (SEE ITEM 11) 28-Jun-2004			
				10A. MOD. OF CONTRACT/ORDER NO.			
				10B. DATED (SEE ITEM 13)			
CODE		FACILITY CODE					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required)							
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.							
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).							
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:							
D. OTHER (Specify type of modification and authority)							
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) Reference Solicitation No. W912EE-04-B-0016, for J. Bennett Johnston Waterway, Mississippi River to Shreveport, LA, Pool 3, Shell Point Structure and Downstream Crossings, scheduled to open at 1400 hours, 29 July 04 is amended as follows: <div style="text-align: center;">(CONTINUED ON PAGE 2.)</div>							
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				TEL: _____ EMAIL: _____			
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED 19-Jul-2004	

SECTION SF 30 BLOCK 14 CONTINUATION PAGE
W912EE-04-B-0016

Amend 0001
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SF 30, Block 14, Continuation page

TECHNICAL SPECIFICATIONS

Section 01270 MEASUREMENT AND PAYMENT has been revised and replaced. Paragraph 1.1.2a(1) has been revised.

Section 02052 has been revised and replaced. Paragraph 3.3 EXISTING PIEZOMETERS has been added.

Section 02109 CLEARING AND GRUBBING has been revised and replaced. Paragraph 3.3.1 has been revised.

Section 02226 EXCAVATION, FILL, BACKFILL AND EMBANKMENT has been revised and replaced. Paragraph 3.1.5 has been revised.

Section 02661 WATERLINE RELOCATION has been revised and replaced. Paragraph 2.1.4.1 has been deleted.

DRAWINGS

Drawing Nos. 6A, 25, 26, 27, 28, 29, and 30 have been reissued.

Pages revised by this amendment have the notation "Revised by Amendment 0001" at the bottom of the page. Text deleted by this amendment is shown as overstruck. Text added by this amendment is shown as underlined.

Encls: Section 01270, pages 1 thru 4
Section 02052, pages 1 thru 4
Section 02109, pages 1 thru 5
Section 02226, pages 1 thru 14
Section 02661, pages 1 thru 16

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 - 1.1.2 Lump Sum Items
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SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 LUMP SUM PAYMENT ITEMS

1.1.1 General

Payment items for the work of this contract for which contract lump sum payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, storm water pollution prevention, environmental protection, meeting safety requirements, tests and reports, providing as-built drawings (both blue-line and electronic), for using the Government-furnished software (RMS) and providing all labor and equipment necessary for electronic exchange of information and management of the contract (See Section 01312 QUALITY CONTROL SYSTEM), and for performing all work required for which separate payment is not otherwise provided.

1.1.2 Lump Sum Items

a. "Shell Point Main Structure and Appurtenances"

(1) Payment will be made at the contract lump sum price for all costs associated with constructing the complete and fully operational Shell Point drainage structure and appurtenances (but not including the costs for relocating the existing waterline, constructing the cofferdams, and slide repair, nor including the costs for removal of the lakeside cofferdam, which prices and payments shall be included in the applicable contract unit price items listed in the bidding schedule). The work under this lump sum item includes, but is not necessarily limited to, the downstream cofferdam removal, providing and removing the Louisiana Highway 1240 detour route signage, structure excavation, and structure fill and backfill, including constructing that portion of the downstream berm that is not within the downstream cofferdam, concrete pressure pipe, walkway bridge, chain link security fence and gate, slide gate and manually operated gate hoist, miscellaneous metal, concrete work, inlet and outlet works construction (including stone protection), Louisiana Highway 1240 road reconstruction to the limits damaged by the Contractor's operation, borrow area operations (including clearing and grubbing, topsoil removal and subsequent re-spreading), final drainage structure site grading, final borrow area grading, fertilizing, seeding and mulching of all disturbed areas at the Shell Point Structure and borrow area (not including disturbed areas at the seven crossing sites), all other required work at the structure site for which separate payment is not otherwise provided, and all work incidental thereto.

(2) Unit of measure: lump sum.

b. "Crossing Sites"

(1) Payment will be made at the contract lump sum price for all costs associated with constructing the seven downstream crossing sites, complete and ready for use, including removal of existing structures, clearing and grubbing, temporary fencing for livestock control, excavation, water control, corrugated metal pipes, fill, granular fill, controlled low strength material, engineering fabric, riprap, aggregate base course, aggregate surface course, asphaltic concrete surface course, replacement of permanent fencing removed or damaged by the Contractor's operations, fertilizing, seeding and mulching of disturbed areas at the crossing sites, all other work at the crossing sites, and all work incidental thereto.

(2) Unit of measure: lump sum.

c. "Waterline Relocation"

(1) Payment will be made at the contract lump sum price for all costs associated with performing the two relocations of the existing waterline (Phase I and Phase II) within the limits of the construction of the Shell Point Main Structure and Appurtenances, complete and ready for use, including removal of existing line, trenching, new waterline, encasement pipe, trench backfill, seeding and mulching of disturbed areas associated with the waterline relocation, and all work incidental thereto.

(2) Unit of measure: lump sum.

1.2 UNIT PRICE PAYMENT ITEMS

1.2.1 General

Payment items for the work of this contract on which unit price payments will be made are listed in the BIDDING SCHEDULE and described below. The unit price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, submittal procedures, environmental protection, storm water pollution prevention, meeting safety requirements, tests and reports, providing as-built drawings (both blue-line and electronic), for using the Government-furnished software (RMS) and providing all labor and equipment necessary for electronic exchange of information and management of the contract (See Section 01312 QUALITY CONTROL SYSTEM), and for performing all work required for each of the unit price items.

1.2.2 Unit Price Items

a. "Shell Point Structure, Cofferdams and Slide Repair"

(1) Payment will be made at the contract unit price for all costs associated with constructing the cofferdams at the Shell Point structure site, including excavating, hauling, placing, compacting and shaping of materials, performing moisture control and density testing, and all work incidental thereto. Payment will also be

made at the contract unit price for all costs associated with constructing the slide repair at the Shell Point structure site, including removal of existing material, backfill of the resulting excavation (including excavating from borrow, hauling, placing, compacting and final surface grading of replacement materials, and performing moisture control and density testing), and all work incidental thereto. Payment for fertilizing, seeding and mulching of these disturbed areas will be included in the contract lump sum price for "Shell Point Main Structure and Appurtenances".

(2) Measurement for constructing the cofferdams and slide repair will be made at the borrow site(s) by computing the volume of material removed for cofferdams and slide repair. Measurement will be based on "before" and "after" surveys conducted by the Government. "Before" surveys of the borrow area(s) will be conducted after clearing and grubbing operations are complete.

(3) Unit of measure: cubic yard.

b. "Shell Point Structure, Lakeside Cofferdam Removal"

(1) Payment will be made for all costs associated with the removal of the lakeside cofferdam (to the elevation specified), including the cost of hauling and placing the material into the Government furnished borrow area, and all work incidental thereto.

(2) Measurement for removal of the lakeside cofferdam will be made at the cofferdam site by computing the volume difference between finished cofferdam surveys conducted by the Government and the theoretical section to remain. No allowance will be made for excavation below the grades shown within allowable tolerance or outside the limits shown.

(3) Unit of measure: cubic yard.

PART 2 PRODUCTS (Not Applicable)

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SECTION 02052

DEMOLITION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 698	(2000a) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.2 SYSTEM DESCRIPTION

Demolition at the structure site shall consist of removing the existing temporary piezometers and the levee roadway pavement and base course material. Demolition at the crossing sites shall consist of removal of existing culverts, headwalls, bridges, piling, fencing, roads, and other items as necessary to construct the crossings in accordance with these plans and specifications.

1.3 SUBMITTALS

Government approval is required for all submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-18 Records

Interruption of Traffic; FIO,

Request for written approval for interruption of traffic shall be submitted at least 48 hours prior to work.

PART 2 PRODUCTS

2.1 FILL MATERIAL

Fill material shall be as specified in Section 02226 EXCAVATION, FILL, BACKFILL AND EMBANKMENT, paragraph RANDOM FILL AND BACKFILL. In addition, fill material shall be free from roots and other organic matter, trash,

debris, frozen materials, and stones larger than 2 inches in any dimension.

Proposed fill material shall be sampled and tested by an approved soil testing laboratory, as follows:

Soil classification	ASTM D 2487
Moisture-density relations	ASTM D 698

PART 3 EXECUTION

3.1 PRECAUTION AGAINST MOVEMENT

The Contractor shall provide shoring and bracing or other supports to prevent movement, settlement, or collapse of facilities adjacent to areas of alteration and removal that are to remain.

3.2 DEMOLITION AND REMOVAL WORK

3.2.1 Filling Voids

Prior to filling, voids shall be free of standing water, frost, frozen material, trash, and debris. Voids resulting from the demolition of structures shall be completely filled with specified fill material and graded. Fill material shall be placed in horizontal layers not to exceed 6 inches in loose depth. Each layer shall be compacted to a minimum of 95 percent of the maximum density as determined by the Contractor in accordance with ASTM D 698, at optimum moisture content. In-place density testing shall be performed on each lift in accordance with ASTM D 2922. After fill has been placed, the surface of the fill shall be graded to meet adjacent contours and to provide surface water drainage.

3.2.2 Protective Measures

Existing construction shall not be disturbed beyond that indicated or necessary for installation of new work.

3.3 EXISTING PIEZOMETERS

Each of the existing piezometers shown on the drawings (P1 and P2) are 1-1/4 inch in diameter by 60 feet long. A licensed driller shall fill out LADOTD, Water Resources Section, Water Well Plugging and Abandonment Form (DOTD-GW-2) and abandon the piezometer in accordance with "Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook", Louisiana Department of Environmental Quality and Louisiana Department of Transportation and Development, December 2000. Copies of forms and handbook can be obtained from: Louisiana Department of Transportation and Development, Water Resources Section, P.O. Box 94245, Baton Rouge, LA 70804-9245 or <http://gis.dotd.state.la.us/wells/intro.html> or www.deq.state.la.us

3.4 DISPOSAL OF REMOVED MATERIALS

3.4.1 General

Debris, rubbish, scrap, and other non-salvageable materials resulting from demolition and removal operations shall be disposed of in accordance with all applicable federal, state and local regulations as contractually specified off the site. Removed materials shall not be stored on the

project site.

3.4.2 Burning on Government Property

Burning of materials removed from demolished structures will not be permitted on Government property. Combustible materials removed from demolished structures shall be transported to designated areas and burned. Fires shall be controlled to provide protection of persons and property.

3.4.3 Removal from Government Property

Waste materials removed from demolished structures, except waste soil, shall be transported from Government property for disposal. Disposal of waste soil shall be as directed.

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SECTION 02109

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 REGULATORY REQUIREMENTS

The regulatory requirements listed below form a part of this specification to the extent referenced. The regulatory requirements are referred to in the text by basic designation only.

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY (LA DEQ)

LA DEQ-01

Air Quality Division
3945 North I 10 Serve Road
Metairie, Louisiana 70002
Telephone: (504) 838-5361

1.2 GENERAL REQUIREMENTS

All clearing and grubbing work for construction shall be completed prior to excavation or embankment construction. If regrowth of vegetation or trees occurs after clearing and grubbing and before construction, the Contractor will be required to clear and grub the area again prior to excavation or embankment construction, and no payment will be made for this additional clearing and grubbing.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 CLEARING

3.1.1 General

Clearing, unless otherwise specified, shall consist of the complete removal above the ground surface of all trees, stumps, down timber, snags, brush, vegetation, abandoned structures, fencing, existing drainage structures, and similar debris.

3.1.2 Merchantable Timber

Merchantable timber remaining within the areas to be cleared on or after the date of award of this contract may be disposed of as the Contractor sees fit, as long as such merchantable timber is either removed from the construction limits indicated on the drawings or is satisfactorily disposed of in accordance with paragraph DISPOSAL OF DEBRIS. The Contractor is precluded from making any claim for time extensions, costs, or damage to his operations by reason of the existence or nonexistence of merchantable timber, crops, debris, or stumps within the areas to be cleared.

3.1.3 Trees

Trees shall be felled in such a manner as to avoid damage to trees to be left standing, to existing structures and installations and to those under

construction, and with due regard for the safety of employees and others.

3.1.4 Vegetation

Vegetation to be removed shall consist of crops, grass, bushes, and weeds. Vegetation shall be removed to provide a completely bare earth surface.

3.1.5 Miscellaneous Structure Foundations and Debris

The Contractor shall also remove any other materials which remain.

3.1.6 Areas to be Cleared

3.1.6.1 General

The entire area of the structures, excavations, embankments, cofferdam and roads shall be cleared of all trees, brush, drift, miscellaneous debris, or other obstructions that would hinder excavation or grading, and subsequent construction operations. Clearing shall be limited to the absolute minimum necessary for construction of the work, together with strips 5 feet wide contiguous thereto. Care shall be taken by the Contractor not to cut or injure any trees which do not unreasonably interfere with the construction.

Growth around the work area shall be preserved to the maximum extent practicable. Clearing shall be limited to approved areas. All trees and brush within the areas authorized to be cleared shall be felled and together with drift and other debris shall be disposed of in accordance with paragraph DISPOSAL OF DEBRIS.

3.1.6.2 Borrow Areas

Borrow areas shall be cleared to the extent necessary to provide materials free from unsuitable materials as described in Section 02226 EXCAVATION, FILL, BACKFILL AND EMBANKMENT, paragraph UNSUITABLE MATERIALS. Certain stumps and areas containing masses of organic or other unsuitable material may be left in place upon approval.

3.1.6.3 Area Between Cofferdam and Excavation

The entire area between the inside toe of slope for the cofferdam embankment and the outer limits of the excavation shall be cleared.

3.1.6.4 Stockpile Areas

Areas for use as temporary stockpile areas, as approved by the Contracting Officer, shall be cleared to the extent necessary to accommodate the materials and to preclude contamination of the materials.

3.2 GRUBBING

3.2.1 General

Grubbing shall consist of the removal of all stumps, roots, buried logs, old paving, old foundations, pipes, drains, and other unsuitable materials as described in Section 02226 EXCAVATION, FILL, BACKFILL AND EMBANKMENT.

3.2.2 Areas to be Grubbed

3.2.2.1 Embankments, Structures, and Road Subgrade

Grubbing shall be performed within the limits of the excavations, berms, and embankments and all structures together with the 5 foot strips contiguous thereto. Grubbing shall be performed along the ground line beneath the roadway surfacing and embankment of the road. All roots and other projections over 1 1/2 inches in diameter shall be removed to a depth of 1 foot below the natural surface of the ground, to a depth of 3 feet below the subgrade for the road, and to a depth of 3 feet below the subgrade for the foundation of the structures. The areas to be grubbed are those specific areas within the limits specified herein above from which trees, stumps, down timber, snags, old piling, abandoned structures, and other projections have been removed.

3.2.2.2 Channels and Ditches

All stumps and exposed roots and other obstructions shall be removed from within the limits of all channels to be constructed.

3.2.2.3 Borrow Areas

Grubbing of borrow area will be required to the extent necessary to provide materials free from unsuitable materials as described in Section 02226 EXCAVATION, FILL, BACKFILL AND EMBANKMENT.

3.2.2.4 Area Between Cofferdam and Excavation

All stumps and exposed roots and other obstructions shall be removed from the entire area between the inside toe of the slope for the cofferdam embankment and the outer limits of the excavation.

3.2.3 Pipes and Drains

The Contractor shall inform the Contracting Officer of all pipes and drains not shown on the drawings which are encountered during grubbing. Such pipes and drains shall not be removed or disturbed until so directed.

3.2.4 Filling of Holes

All holes caused by grubbing operations and removal of pipes, drains, and structures foundations, excluding holes in the borrow area, channels, and ditches, shall be backfilled with suitable material as described in Section 02226 EXCAVATION, FILL, BACKFILL AND EMBANKMENT, paragraph RANDOM FILL AND BACKFILL, in 12-inch layers to the elevation of the adjacent ground surface, and each layer shall be compacted to a density at least equal to that of the adjoining undisturbed materials.

3.3 DISPOSAL OF DEBRIS

3.3.1 General

All debris resulting from clearing and grubbing operations shall be disposed of by removal from the site. Burning will not be permitted. The Contractor shall make a reasonable effort to channel merchantable material into the commercial market to make beneficial use of materials resulting from clearing and grubbing operations.

3.3.2 Removal from Site of Work

The Contractor shall remove all of the debris resulting from clearing and grubbing operations from the Government furnished rights-of-way. Such

disposal shall comply with all applicable Federal, State and local laws. The Contractor may, at his option, either retain for his own use or dispose of by sale or otherwise, any such materials of value. The Government is not responsible for the protection or safekeeping of any materials retained by the Contractor. Such materials shall be removed from the site of the work before the date of completion of the work. If debris from clearing operations is placed on adjacent property, the Contractor shall obtain additional rights-of-way for such purposes, without cost to the Government and in accordance with Section 01000 GENERAL CONTRACT REQUIREMENTS, paragraph RIGHTS-OF-WAY. Such material shall be so placed as not to interfere with roads, drainage or other improvements, and in such a manner as to eliminate the possibility of its entering into channels, ditches or streams. The Contracting Officer reserves the right to approve or disapprove the use of Contractor-furnished disposal areas based on the location of the areas and a determination of the overall impact the proposed disposal will have on the environment. Contractor-furnished disposal areas shall not be located in woodlands or wetlands. Disapproval by the Contracting Officer of Contractor-furnished disposal areas shall not form the basis of a claim against the Government. No separate payment will be made for Contractor-furnished disposal area(s).

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SECTION 02226

EXCAVATION, FILL, BACKFILL AND EMBANKMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C600 (1999) Installation of Ductile-Iron Water Mains and Their Appurtenances

ASTM INTERNATIONAL (ASTM)

ASTM D 698 (2000a) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

ASTM D 1556 (2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 2167 (1994; R 2001) Density and Unit Weight of Soil in Place by the Rubber Balloon Method

ASTM D 2216 (1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487 (2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2922 (2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 3017 (2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

ASTM D 4253 (2000) Maximum Index Density and Unit Weight of Soils Using a Vibratory Table

ASTM D 4254 (2000) Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Backfill and Fill Materials

2.1.1.1 General

All materials for backfill and embankment shall be free of roots, trash and other objectionable matter and shall be obtained from the required excavations, from the designated borrow area, or from approved Contractor furnished off site borrow areas or sources at no additional cost to the Government. No frozen material shall be placed and material shall not be placed against frozen surfaces.

2.1.1.2 Pervious Backfill

Pervious backfill shall be washed sand composed of tough, durable particles and shall contain no organic matter nor soft, friable particles. The pervious backfill material shall be clean, free draining sand (SP and SW) classified in accordance with ASTM D 2487.

2.1.1.3 Random Fill and Backfill

Except as specified below, structure backfill and semicompacted embankment and backfill material shall consist of any or all types of materials (except organic materials) from required excavation or from borrow. Clay (CH) shall not be used as random fill or backfill, except that clay (CH) may be used for cofferdam embankment and clay blanket. Material classified in accordance with ASTM D 2487 as gravels (GW, GP, GM) and sands (SW, SP, SM) shall not be used for any fill or backfill unless suitably blended with less pervious material. The addition of less pervious material and the blending shall be accomplished to such a degree that the material is changed to a classification other than gravels (GW, GP, GM) and sands (SW, SP, SM) such as clayey gravel (GC) or clayey sand (SC). No additional payment will be made for blending materials, and all costs for blending materials shall be included in the applicable contract lump sum price listed in the bidding schedule for which the material forms a part.

2.1.1.4 Clay Material

Clay material shall be classified as clay (CL) or (CH) in accordance with ASTM D 2487.

2.1.1.5 Frozen Materials

Under no circumstances shall frozen earth, snow, or ice be placed in embankment or backfill. The Contracting Officer may require the wasting of frozen material in order that construction may proceed and such material wasted by written order of the Contracting Officer will be paid for in accordance with the Contract Clause entitled CHANGES. The Contractor may waste frozen material, at his own expense, in order to proceed with the work even when the Contracting Officer has not issued a written order.

2.1.1.6 Unsuitable Materials

Materials which are classified as unsuitable for embankment or backfill material are defined as masses of organic matter, sticks, branches, roots and other debris. As earth may contain excessive amounts of wood, isolated pieces of wood will not be considered objectionable in the embankment provided their length does not exceed one foot, their cross-sectional area is less than 4 square inches, and they are distributed throughout the fill. Not more than one percent (by volume) of objectionable material shall be contained in the earth material placed in each cubic yard of the levee section. Pockets and/or zones of wood shall not be placed in the

embankment or backfill.

2.2 BURIED WARNING AND IDENTIFICATION TAPE

Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Blue: Water Systems

2.2.1 Warning Tape for Metallic Piping

Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.2.2 Detectable Warning Tape for Non-Metallic Piping

Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

PART 3 EXECUTION

3.1 EXCAVATION

3.1.1 General

Excavation shall consist of removal and disposal of all materials of whatever nature encountered to excavate for structural foundations, pipe trench, slide repair and channels. Excavation may be performed by any approved methods which will produce the desired results. Approximately 6 inches of top soil shall be removed from the borrow area, structure areas and the slide area and stockpiled for reuse in the top 6 inches of fill in those areas from which it was removed, provided the material is otherwise suitable.

3.1.2 Excavation for Structures and Channels

The foundations for the structures shall be excavated to the lines and grades necessary for placement of formwork and concrete and that will insure stable slope conditions throughout the construction. The channels shall be excavated to the lines, grades and sections indicated on the drawings, within allowable tolerance. All foundations shall be on solid, undisturbed or properly compacted material. The bottom and side slopes of

excavation upon or against which concrete or filters are to be placed shall be accurately finished to the dimensions prescribed or directed, within allowable tolerance. Where disturbed by the Contractor's operations and elsewhere as required, the excavated surfaces shall be moistened with water or dried as necessary and tamped or rolled with suitable tools or equipment for the purpose of thoroughly compacting them and forming firm foundations upon or against which to place the concrete or stone. Except for the permissible tolerance, overexcavation will not be permitted except to remove unsuitable material as directed by the Contracting Officer. If at any point in the excavation, unauthorized excavation is made beyond the excavation lines shown on the drawings, such unauthorized overexcavation shall be backfilled with approved materials, placed in layers not more than 4 inches in thickness, and thoroughly compacted by tamping or rolling to a density at least equal to that of the adjacent similar undisturbed material, at no additional cost to the Government. Allowable tolerances shall be as specified in paragraph GRADE TOLERANCES.

3.1.3 Excavation for Levee Slide

Prior to excavating for the levee slide, approximately 6 inches of top soil shall be removed from the slide area and stockpiled for reuse, provided it is otherwise suitable. The excavation line shall extend at least 1 foot below the failure slide plane. Location of the slide plane will be determined by the Contracting Officer's Representative. The end slopes of the levee slide excavation shall be 1 foot vertical on 3 feet horizontal to allow for access and proper compaction. All material from the slide repair area shall be reused in the cofferdam or disposed of as specified in paragraph EXCAVATION, subparagraph DISPOSAL OF EXCAVATED MATERIALS.

3.1.4 Removal of Unsuitable Materials

If, at any point in the excavation for the structures, the foundation material below the lines indicated on the drawings is found to be unsuitable, it shall be removed to the depth directed by the Contracting Officer and replaced with approved material placed and compacted as specified above for backfill of overexcavation. Payment for authorized overexcavation and backfill of authorized overexcavation will be made in accordance with the Contract Clause entitled CHANGES.

3.1.5 Disposal of Excavated Materials

Suitable materials removed from required excavation shall be disposed of by placing directly into embankment or backfill, or by stockpiling for later use in embankment or backfill. The removed and stockpiled topsoil shall be reused for the top 6 inches of fill in those areas from which it was removed and as shown on the drawings, provided the material is otherwise suitable. Earth ~~Mm~~ materials from structures which are not suitable for use as embankment or backfill, or in excess of that required for embankment or backfill, shall be disposed of by placing it in the Government furnished borrow area. Earth ~~Mm~~ materials from excavation at the crossing sites which are not suitable for use as fill, or are in excess of that required for fill, shall be disposed of by placing in the Government furnished borrow area or outside the Government furnished rights-of-way in Contractor furnished disposal area(s). Organic material, concrete, asphalt, stone, and any non-earthen material removed during borrow excavation and required excavation (excluding culverts, waterlines, and gas lines) shall either be removed from the site and placed in Contractor furnished disposal areas, or buried in the bottom of the borrow area and covered with not less than 36-inches of earth placed in layers not to exceed 12-inches in thickness.

Concrete and asphalt to be buried in the borrow area shall be broken up so as to not create voids within the disposed material. Culverts that are salvageable and the truck body bridge at Crossing Site 3 shall not become the property of the Contractor and shall be stockpiled within the right-of-way as directed. Unsalvageable culverts, waterlines, and gas lines shall be disposed of by removal from the site. The location and dimensions of the Contractor-furnished disposal area(s) shall be approved prior to disposal of any material. Disposal area shall not be located in any river, stream, lake or wetland area. The Contractor shall obtain the rights-of-way for the disposal area(s) in accordance with Section 01000 GENERAL CONTRACT REQUIREMENTS, paragraph RIGHTS-OF-WAY. No separate payment will be made for Contractor-furnished disposal area(s). No material shall be stockpiled on the existing levee or within 100 feet of top of the structure excavation. Stockpiles of materials temporarily stored for later use shall be located in areas approved by the Contracting Officer. Stockpiles shall be built up in layers not more than 24 inches in thickness. Stockpiled material shall have a maximum height not to exceed 10 feet, shall have end and/or side slopes not steeper than 1V on 2H, and the surfaces of all stockpiles shall be sloped to drain readily and sealed by compacting. Excavation from stockpiles shall be made so as to maintain drainage at all times. No stockpiled material shall be placed within 20 feet of top bank of inlet or outlet ditches or temporary diversion ditches as finally excavated. No material shall be stockpiled within 20 feet of top bank of structure excavation.

3.1.5.1 Disposal of Discarded Materials

Discarded material other than those which can be included in the solid waste category shall be disposed of as specified in paragraph EXCAVATION, subparagraph DISPOSAL OF EXCAVATED MATERIALS.

3.1.6 Trench Excavation Requirements

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Trench walls more than 4 feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Vertical trench walls more than 4 feet high shall be shored. Trench walls which are cut back shall be excavated to at least the angle of repose of the soil. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.1.6.1 Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 2 inches or greater in any

dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.1.6.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, such material shall be removed 6 inches below the required grade and replaced with suitable materials as provided in paragraph TRENCH BACKFILL.

3.1.6.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph TRENCH BACKFILL. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.

3.1.6.4 Excavation for Appurtenances

Excavation for manholes, catch-basins, inlets, or similar structures shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Loose disintegrated rock and thin strata shall be removed. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.1.7 Temporary Excavation Slopes

No temporary excavation slope shall be steeper than the final design slope.

3.2 BURIED TAPE

Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.3 TRENCH BACKFILL

Trenches shall be backfilled to the grade shown. The trench shall not be backfilled until all specified tests are performed.

3.3.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

3.3.2 Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 6 inches loose thickness.

3.3.3 Bedding and Initial Backfill

Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit.

The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D 698 maximum density.

Plastic piping shall have bedding to spring line of pipe. Provide bedding material consisting of clean sand classified as SP in accordance with ASTM D 2487.

3.3.4 Final Backfill

The remainder of the trench shall be filled with satisfactory material. Backfill material shall be placed and compacted as follows: Turfed or Seeded Areas and Miscellaneous Areas: Backfill shall be deposited in layers of a maximum of 12 inch loose thickness, and compacted to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. Compaction by water flooding or jetting will not be permitted. This requirement shall also apply to all other areas not specifically designated above.

3.4 SPECIAL REQUIREMENTS FOR TRENCH BACKFILL

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.4.1 Water Lines

Trenches shall be of a depth to provide a minimum cover of 3 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

3.5 PLACEMENT

3.5.1 Foundation Preparation

All unsuitable foundation material consisting of soft, wet, or organic material or debris within the area upon which embankment or backfill is to be placed shall be removed to the depth directed before any embankment or backfill materials are placed. Unsuitable material shall be disposed of as specified in paragraph DISPOSAL OF EXCAVATED MATERIALS. The top 6 inches of the ground surface (after clearing and grubbing) shall be disced and then compacted to the same requirements as overlying fill. Sloped ground surfaces steeper than 1V on 5H on which embankment or backfill is to be placed shall be plowed, stepped or benched, or broken up as directed, in such manner that the new material will bond with the existing surface. Prepared surfaces on which embankment and/or backfill is to be placed shall be wetted or dried as may be required to obtain the required compaction.

3.5.2 Backfill and Embankment

3.5.3 General

All embankments and backfills associated with the concrete structure shall be placed as shown on the drawings and compacted as specified herein. Backfills associated with the channels, ditches, cofferdams and levee slide

area outside of the structure limits shall be placed as semicompacted backfill. No backfill or embankment shall be placed on any part of the foundation until such areas have been inspected and approved. Backfill or embankment shall not be placed on or against concrete surfaces prior to 14 days after the placing of the concrete, except when otherwise approved or required. The foundation surface and any concrete surfaces shall be suitably moistened prior to placement of backfill or embankment against them. No backfill shall be placed on frozen surfaces and no frozen materials shall be placed in the backfill embankment. Unless otherwise directed, the backfill or fill shall be brought up and maintained at approximately the same level regardless of the number of types of material being placed. Materials shall be so placed that there is no mixing of the different types of materials in the backfill or fill. Benching into the slope of the existing embankment is required in order to place and compact the material in horizontal layers. The vertical face of the existing embankment resulting from the benching operation shall be a minimum of 1 foot in height but shall not exceed 2 feet in height.

3.5.4 Spreading

After dumping, the materials shall be spread by bulldozer or other approved means in approximately horizontal layers over the entire area under construction. During the dumping and spreading process, the Contractor shall remove all roots, trash and debris from the backfill materials. Semicompacted random and clay materials shall be placed in layers, the first layer not more than 6 inches in thickness and the succeeding layers not more than 12 inches thick prior to compaction. Pervious material, structural backfill and clay blanket material shall be placed in layers not more than 6 inches in thickness prior to compaction, except that pervious material within 2 feet of concrete shall be placed in 4 inch layers. As soon as practicable after commencement of construction of any section of the backfill or fill, the surface shall be sloped to drain freely and shall be so maintained throughout construction. If the compacted surface of any layer of random material is determined to be too smooth to bond properly with the succeeding layers, it shall be loosened by harrowing or by other approved means before the succeeding layer is placed thereon. Ruts in the surface of any layer shall be removed by scarifying before placing and compacting additional materials.

3.6 COMPACTION

3.6.1 Semicompacted Backfill and Embankment

When the moisture content and conditions of the spread layers are within the specified ranges and otherwise satisfactory, each layer of semicompacted fill shall be compacted to at least 93 percent of maximum dry density. Maximum dry density shall be determined by the Contractor in accordance with ASTM D 698.

3.6.2 Fully Compacted Fill and Backfill

3.6.2.1 Random Structural Backfill and Clay Blanket Material

After a layer of structure backfill or clay blanket material material has been dumped and spread, it shall be harrowed or disked, if required, to break up and blend the materials, unless harrowing or disk is performed to obtain uniform moisture distribution. Harrowing or disk is performed with a spring-tooth harrow or other approved harrow or disk to the depth of the uncompacted layer. If one pass of the harrow or disk does

not accomplish the breaking up and blending of the materials, additional passes of the harrow or disk may be required, but in no case will more than three passes of the harrow or disk on any one layer be required for this purpose. When the moisture content and the condition of the layer is within the specified ranges and otherwise satisfactory, the lift shall be compacted to at least 95 percent of the maximum density. Maximum dry density shall be determined by the Contractor in accordance with ASTM D 698.

Portions of the backfill which are not accessible to the roller and portions within 2 feet of concrete shall be placed in 4-inch layers and compacted with power tampers to a degree equal to that required on the other portions of the compacted backfill. Dumping, spreading, sprinkling, and compacting may be performed at the same time at different points along a section when there is sufficient area to permit these operations to proceed simultaneously.

3.6.2.2 Pervious Backfill

Immediately after each layer of pervious backfill material has been dumped, spread and saturated, the entire surface of the layer shall be compacted to an average 80 percent of relative density, with no test less than 75 percent of relative density. Relative density shall be determined by the Contractor in accordance with ASTM D 4254 and ASTM D 4253. Determination of in-place density shall be in accordance with ASTM D 1556.

3.6.2.3 Pipe Backfill

Backfill around the concrete pipe and cmp shall be hand compacted to a level at least three (3) feet above the pipe. The backfill material to be hand compacted shall be placed in layers not exceeding 4 inches in thickness prior to compaction and shall be compacted by hand compaction equipment in such a manner that every point of the surface of each layer of backfill will be compacted the required density. The pipe conduit shall be held securely in place at all times while tamping is being performed to ensure proper bond between the pipe and the ground. No backfill shall be placed against slopes steeper than one (1) horizontal to one (1) vertical unless approved.

3.7 MOISTURE CONTROL

3.7.1 General

The materials in each layer of the backfill and fill shall contain the quantity of moisture within the limits specified below or as directed which is necessary to obtain the desired compaction as determined by the Contracting Officer. No additional payment will be made for any moisture control required.

3.7.2 Semicompacted Backfill and Embankment

The Contractor shall control the moisture content of the semicompacted backfill and embankment. The optimum moisture content shall be determined by the Contractor from representative samples of each type of material in accordance with ASTM D 698. Material placed in the semicompacted fill shall have a moisture content ranging between the following limits:

TYPE OF MATERIAL	MOISTURE CONTENT	
	MAXIMUM	MINIMUM
CH (cofferdam embankment only)	+5	-5
CL	+4	-4

TYPE OF MATERIAL

MOISTURE CONTENT	
MAXIMUM	MINIMUM
+3	-2

ML

The Contractor shall perform the necessary work in moisture control to bring the borrow material within the moisture content range specified above. If the borrow material is too wet, it shall either be stockpiled and allowed to drain before it is placed in the embankment cross sections and/or the wet material shall be processed by discing and harrowing, if necessary, until the moisture content is reduced sufficiently. If the borrow material is too dry, it shall either be prewet in the borrow area, or sufficient moisture shall be uniformly distributed in each layer before compacting.

3.7.3 Structure Backfill and Clay Blanket Material

The moisture content shall be as uniform as practicable throughout any one layer of structure backfill and clay blanket material. The upper and lower limits of moisture content shall not be more than 3 nor less than 2 percentage points, respectively, from the optimum moisture content as determined by the Contracting Officer in accordance with ASTM D 698. The method of determining the moisture content shall be according to ASTM D 2216 or ASTM D 3017. Material that is too wet shall be spread on the backfill and permitted to dry, assisted by disking or harrowing, if necessary, until the moisture content is reduced to a value within the specified limits. When the material is too dry, the Contractor will be required to sprinkle each layer on the backfill. Harrowing or other approved methods will be required to work the moisture into the material until a uniform distribution of moisture is obtained. Water applied on a layer of backfill shall be accurately controlled in quantity so that free water will not appear on the surface during or subsequent to compaction. Should too much water be added to any part of the backfill so that the material is too wet to obtain the desired compaction, the rolling and all work on that section of the backfill shall be delayed until the moisture content of the material is reduced to a value within the specified limits and such delay shall not be the basis for a claim. If it is impracticable to obtain the specified moisture content by wetting or drying the material on the backfill, the Contractor may be required to prewet or dry back the material at the source. If, in the opinion of the Contracting Officer, the top or contact surfaces of a partial backfill section becomes too dry or too wet to permit suitable bond between these surfaces and the additional backfill to be placed thereon, the Contractor shall loosen the dried or wet materials by scarifying or disking to such depths as may be directed by the Contracting Officer, shall dampen or dry the loosened material to an acceptable moisture content and shall compact this layer as provided in paragraph COMPACTION, to densities comparable to the underlying backfill at no additional cost to the Government.

3.7.4 Pervious Material

Pervious material shall be wetted by sprinkling after spreading for compaction and each layer shall be kept in a saturated condition during compaction. Sprinkling shall be done by approved methods. All connections in the water supply system shall be watertight. Jets shall not be directed at the backfill with such force that finer materials will be washed out. Pervious backfill materials shall be kept free of muddy water and surface runoff and any pervious backfill material which becomes contaminated shall be removed and replaced at no expense to the Government.

3.8 SLIDES

3.8.1 Embankment Slides

In the event of the sliding of any part of the embankment during construction or after completion, but prior to acceptance, the Contractor shall, upon written order of the Contracting Officer, cut out and remove the slide and then rebuild that portion of the embankment or as an alternative shall construct a stability berm of such dimensions and placed in such manner as the Contracting Officer shall prescribe. In case the slide is caused through fault or negligence of the Contractor, the foregoing operations shall be performed without cost to the Government. In case the slide in the embankment is not caused through fault or negligence of the Contractor, the yardage ordered removed from the embankment and yardage replaced in the embankment and fill yardage for stability berms will be paid for in accordance with the Contract Clause entitled CHANGES, in addition to any payment due the Contractor for materials previously placed. In either case, the method of slide correction will be determined by the Contracting Officer.

3.8.2 Channel Slides

In case sliding occurs in any part of the prescribed excavation for the inlet or outlet channel during construction or after completion but prior to acceptance, the Contractor shall remove and repair such portions of the slides as the Contracting Officer may direct. In case the slide is caused through fault or negligence of the Contractor, the slide shall be removed and repaired without cost to the Government. In case the slide is not caused through fault or negligence of the Contractor, an equitable adjustment pursuant to the Contract Clause entitled CHANGES will be made for removing and repairing the slide.

3.9 GRADE TOLERANCES

3.9.1 General

Embankments, excavations and backfills shall be constructed to the lines and grades and sections indicated on the drawings. The following tolerances will be permitted above and below the design grades and cross sections provided that the areas drain and there are no abrupt bulges or depressions in surfaces and side slopes are uniform. Neither extreme of such tolerances may be continuous over an area greater than 200 square feet and abrupt changes from one extreme to the other will not be permitted.

3.9.2 Road Crown

For the crown surface of the road embankment (edge of shoulder to edge of shoulder), a vertical tolerance of plus or minus 1/2-inch will be permitted. A horizontal tolerance of plus or minus three (3) inches will be permitted.

3.9.3 Embankments, Slopes, and Structures

For the side slopes of the road embankment and fill areas adjacent to permanent structures, a vertical tolerance of plus or minus two (2) inches will be permitted.

3.9.4 Channels

For the bottom elevation and side slopes of the channels, a vertical tolerance of plus or minus six (6) inches will be permitted. Bottom and side slopes shall present a neat, smooth surface, and shall be free from all obstructions.

3.9.5 Structure Excavation

For the bottom and side slopes of structure excavation upon or against which concrete or filters are to be placed, a vertical tolerance of plus 1/2-inch and minus two (2) inches will be permitted.

3.9.6 Stone Protection Areas

For areas to receive stone protection, a tolerance of plus two (2) inches and minus four (4) inches will be permitted.

3.10 FIELD TESTING CONTROL

Testing shall be the responsibility of the Contractor and shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Field density and moisture content tests shall be performed on every 250 cubic yards of material placed. Field in-place density shall be determined in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. The calibration checks of both the density and moisture gages shall be made at the beginning of a job on each different type of material encountered and at intervals as directed. The Contractor shall submit three copies daily of control tests and reports as well as records of corrective action taken in accordance with Section 01451 CONTRACTOR QUALITY CONTROL.

-- End of Section --

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SECTION 02661

WATERLINE RELOCATION

PART 1 GENERAL

PROPRIETARY INFORMATION CONTAINED HEREIN IS REQUIRED BY WEST GRANT WATER SYSTEM AND THE SPECIFIED MATERIAL AND PROCEDURES HAVE BEEN APPROVED BY THE LOUISIANA DEPARTMENT OF HEALTH AND HOSPITALS.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.1 (2000) Cast Iron Pipe Flanges and Flanged Fittings

AMERICAN PETROLEUM INSTITUTE (API)

API Spec 5L (2000) Line Pipe

ASTM INTERNATIONAL (ASTM)

ASTM A 48 (1994ae1) Gray Iron Castings

ASTM A 536 (1984; R 1999e1) Ductile Iron Castings

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300 (1999) Hypochlorites

AWWA B301 (1999) Liquid Chlorine

AWWA C105 (1999) Polyethylene Encasement for Ductile-Iron Pipe Systems

AWWA C110 (1998) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm through 1219 mm), for Water

AWWA C111 (2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

AWWA C115 (1999) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges

AWWA C509 (2001) Resilient-Seated Gate Valves for Water Supply Service

AWWA C550 (2001) Protective Epoxy Interior Coatings for Valves and Hydrants

AWWA C600	(1999) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C651	(1999) Disinfecting Water Mains
AWWA C906	(1999) Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) through 63 In., (1,575 mm) for Water Distribution and Transmission
ANSI/AWWA C105/A21.5	(1999) Polyethylene Encasement for Ductile-Iron Pipe Systems
ANSI/AWWA C111/A21.11	(2000) Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
ANSI/AWWA C153/A21.53	(2000) Ductile-Iron Compact Fittings for Water Service

NSF INTERNATIONAL (NSF)

NSF 61	(2001; Addendum 1 - Sep 2001) Drinking Water System Components - Health Effects
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1.2 GENERAL

Waterline relocations are covered herein, complete. Pipe and accessories shall be new and unused unless otherwise approved.

1.2.1 Waterlines

Waterlines of the types and sizes indicated shall be installed as shown, except that the waterline alignment shall be varied as necessary to avoid obstructions. In general, the waterlines shall be placed a minimum of 36 inches below the finished ground surface.

1.2.2 Procedures

The procedures contained in AWWA C651 shall be applied as follows, and the costs of these procedures, as well as the cost of water used, shall be at no additional cost to the Government.

- a. Preventing contaminating materials from entering the waterlines during construction.
- b. Preliminary flushing to remove foreign materials that may have entered the line.
- c. Disinfecting any residual contamination.
- d. Final flushing.
- e. Taking bacteriologic tests.

1.2.3 Acceptance

Work will not be accepted until testing and filling connected with the work has been completed satisfactorily. Any section of water pipe that is found

defective in material, alinement, grade or joints before acceptance shall be satisfactorily corrected by the Contractor at no additional cost to the Government.

1.2.4 Plastic Pipe

Plastic pipe used for waterlines shall be protected during storage and installation from direct sunlight and excess heat. Any deformed or defective pipe shall be replaced by the Contractor at no additional cost to the Government. Immediately after laying, plastic pipe shall be covered, leaving joints exposed until after completion of the necessary tests.

1.3 SUBMITTALS

Government approval is required for all submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Materials and Equipment; G

A schedule of materials and equipment proposed for installation, shall be submitted before installation for approval in accordance with Section 00800 SPECIAL CONTRACT REQUIREMENTS, paragraphs PERFORMANCE OF WORK BY THE CONTRACTOR and CONTRACT DRAWING, MAPS AND SPECIFICATIONS.

SD-09 Test Reports

Hydrostatic Tests

All hydrostatic tests shall be performed in the presence of the Contracting Officer and the West Bend Water System and their results documented.

Bacteriologic Testing

A copy of all bacteriologic test results and the state agency approval document shall be submitted.

SD-13 Certificates

Materials

Documents describing the materials to be supplied shall be furnished.

1.4 REGULATORY REQUIREMENTS

The regulation requirements listed below form a part of this specification to the extent referenced. The regulatory requirements are referred to in the text by basic designation only.

LOUISIANA DEPARTMENT OF HEALTH AND HOSPITALS (LA DHH)

LA DHH-01

Office of Public Health

LOUISIANA DEPARTMENT OF HEALTH AND HOSPITALS (LA DHH)
Central Regional Office
5604B Coliseum Blvd.
Alexandria, Louisiana 71303
ATTN: Michael Cazes

1.5 COORDINATION

Prior to any work being performed on the waterline, the Contractor shall contact and coordinate with the West Grant Water System, 123 Hwy 1240, Verda, Louisiana 71481, telephone (318) 646-2539. Point of contact is Mr. Joshua Raines or Mr. James McGee, telephone (318) 646-2539 or (318) 729-6756.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General

The schedule of proposed materials and equipment for installation shall include, but not be limited to the following items, and materials shall conform to the respective specifications and other requirements specified herein. Catalog cuts for all materials such as piping, and valves shall be furnished prior to installation.

2.1.2 Concrete

Concrete shall conform to the applicable requirements of Section 03307 CONCRETE. Top nominal aggregate size shall be 3/4-inch.

2.1.3 Pipe and Tubing Joints

2.1.3.1 Ductile Iron Pipe Joints

Mechanical joint shall conform to AWWA C110, AWWA C111, and AWWA C115.

2.1.4 Pipe, Tubing, and Fittings

~~2.1.4.1 Ductile Iron Pipe and Fittings~~

~~Where required or specified, ductile iron pipe shall be either push on or mechanical joint conforming to AWWA C151 unless the type is specifically shown or specified. Thickness class shall be 51, minimum. Fittings shall be cast iron or ductile iron conforming to AWWA C110. Joints and gaskets shall conform to AWWA C111. Bolts and nuts shall be cadmium plated. All pipe and fittings shall have a 1/16 inch thick (minimum) cement mortar interior lining with asphaltic seal coat conforming to AWWA C104. External surfaces of all pipe and fitting shall have a factory applied bituminous coating conforming to the applicable pipe or fitting standard.~~

2.1.5 Plastic Water Pipe and Fittings

2.1.5.1 Polyethylene Water Pipe and Fittings (Restrained Joints by Butt Fusion)

Polyethylene water pipe shall conform to the requirements of AWWA C906, and shall be PE 3408 SDR 11 3500 psi Design Stress, with a potable Water

Service Certification in accordance with NSF 14 No. 14. Polyethylene pipe shall be Phillips "Drisco Pipe 4000" or Chevron, "Plexco Bluestrip" pipe. The requirements for the specific type of butt fused polyethylene pipe to be used is 6 inch PE (Polyethylene) 3408 SDR 11 D.I.P.S. (AWWA C906). HDPE pipe shall have joints that are joined by butt fusion methods and shall be performed in strict accordance with the pipe manufacturers recommendations. The butt fusion equipment shall be capable of developing 100 percent efficient joint weld to develop a strength greater than the tensile strength of the pipe. Socket fusion will not be used.

2.1.5.2 Bolts and Nuts for Mechanical Joint Fittings

Bolts and nuts for mechanical joints shall be Cor-Ten T bolts as manufactured by NSS Industries of Plymouth, Michigan (1-800-221-5125).

2.1.6 Valves

2.1.6.1 Valve and Valve Boxes (Underground)

Gate valves shall be resilient seated wedge type and shall be iron body, non-rising stem with "O" ring stem seals, open left with 2 inch square operating nut and with mechanical joint ends. All gate valves shall comply with the latest revision of the AWWA C509 for resilient seated wedge-type gate valves with fusion bonded epoxy coating conforming to AWWA C550 and NSF 61. Valves shall be as manufactured by Nueller, M&H or approved equal.

2.1.7 Cast Iron Valve Boxes

a. Valve boxes shall be three piece adjustable 5 1/4 inch shaft diameter, high grade screw-type cast iron valve boxes as manufactured by the Tyler Corporation of Tyler, Texas, Series 6850 or approved equal. The cast iron valve box shall have a base large enough to fit completely over the valve bonnet and shall have the word "Water" embossed on the top side of its cover.

b. Iron bodied gate valves shall be wrapped with an 8 mil thickness polyethylene wrap.

2.1.8 Tapping Sleeves and Valves and Valve Boxes

a. Tapping sleeves for PVC and ductile iron water mains shall be of heavy cast iron, mechanical joint end connections, 200 psi maximum working pressure, designed to meet or exceed AWWA Standards. Sleeve section shall be sized for the pipe on which it is to be mounted. The outlet or branch shall be flanged for acceptance of the companion tapping valve. Gaskets shall be plain end.

b. Tapping valves shall be resilient seated wedge type and shall be iron body, non-rising stem with "O" ring stem seals, open left with 2 inch square operating nut with flanged inlets in accordance with ANSI B16.1, Class 125 and mechanical joint outlets. All tapping valves shall comply with the latest revision of AWWA C509 for resilient seated wedge type gate valves with fusion bonded epoxy coating conforming to AWWA C550 and NSF 61. Tapping valves shall be as manufactured by Mueller, M&H or approved equal.

c. Valve boxes shall be a three piece, adjustable, cast iron box with concrete pad as specified under Valves and Valve Boxes

(Underground).

2.1.9 Keys and Tee Handle Wrenches

The Contractor shall furnish 2 pentagon socket keys for each size pentagon nut and two 6 foot long tee handle wrenches with adapters to fit each size of square head nut on the valves.

2.1.10 Iron Castings

Iron castings shall conform to ASTM A 48~~ASTM A 48~~.

2.1.11 Disinfecting Agents

Materials for disinfection shall conform to the following:

2.1.11.1 Chlorine, Liquid

AWWA B301.

2.1.11.2 Hypochlorite, Calcium and Sodium

AWWA B300.

2.1.12 Pipe Cutters

Unless otherwise recommended by the manufacturer or authorized, cutting shall be done with an approved type mechanical cutter. Wheel cutters shall be used when practicable.

2.1.13 Polyethelyne (PE) to Mechanical Joint (MJ) Adapters

Transitions to join polyethylene (PE) water pipe to PVC water pipe shall be made by a polyethylene flange adapter with ductile iron backup ring butt fused to the polyethylene pipe and a flanged by mechanical joint adapter with EBAA Iron Series 2000 PV retainer gland or with the adapter bolted to a swivel mechanical joint fitting. Where the connection is to in-line PVC pipe, provide joint restraints on all joints within 40 feet of the transition. PE to MJ adapters shall be as manufactured by Phillips Driscopipe or approved equal.

2.1.14 Mechanical Joint Restraint Devices

Mechanical joint restraint devices shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A 536. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53 of latest revision. Twist-off nuts shall be used to insure proper actuating of the restraining devices. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG or approved equal.

2.1.15 Cutting-In-Sleeves

Cutting-in-sleeves for connection to existing water mains shall be Power Seal 3520, 6 inch Mechanical Joint.

2.1.16 Caps and Plugs

Caps and plugs for lines remain in service shall be constructed of Ductile Iron. All caps and plugs shall be adequately sized.

2.1.17 Polyethylene Wrap

Polyethylene wrap shall conform to AWWA C105 specifications. Film shall be Class "C" - Black, with a minimum nominal thickness of 0.008 inches (8 mils). Tape for securing the film shall be thermoplastic material with a pressure sensitive adhesive face capable of bonding to metal, bituminous coating and polyethylene. Tape shall have a minimum thickness of 8 mils, and a minimum width of 1 inch. The polyethylene film envelope shall be free as is commercially possible of gels, streaks, pinholes, particles of foreign matter, and undispersed raw materials. There shall be no other visible defect such as holes, tears, blisters, or thinning out at folds. Manufacturers shall furnish a certification of conformance of the material to the requirement of ANSI/AWWA C105/A21.5. The polywrap shall be as manufactured by Dupont or approved equal. The tape shall be Scotch Wrap No. 50 or approved equal.

2.1.18 Non-Corrosive Metallic Wire

Non-corrosive metallic wire installed over polyethylene and PVC pipe for detection purposes shall be copper wire, Type TW, A.W.G. #14 gauge stranded. Wire splices shall be made using a "3M" Brand Direct Bury Splice Kit Model DBR.

2.1.19 Concrete For Thrust Blocking

Concrete required for thrust blocking shall be Class A with a 28-day compressive strength of 3,000 psi and in conformance with 03307 CONCRETE.

2.1.20 Concrete for Valve Box Pads

Concrete required for the valve box pads shall be Class A with a 28-day compressive strength of 3,000 psi and in conformance with 03307 CONCRETE.

2.1.21 Backfill Material for Valves and Valve Boxes

Unified Soil Classification of "CL" (sand clay) with a PI range of 6-15 locally known as "red dirt".

2.1.22 Foster Adapter

Foster adapters shall be installed where shown on the drawings to connect mechanical joints to mechanical joints. Foster Adapters shall be as manufactured by Infact Corporation of Fairview, Tennessee (1-888-773-9130).

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 General

Excavation and backfilling of trenches shall conform to Section 02226

EXCAVATION, FILL, BACKFILL AND EMBANKMENT. All piping shall be assembled by a method approved. If bell and spigot pipe is used, the spigot ends of bell and spigot pipe shall be laid pointing in the direction of the flow.

3.1.1.2 Jointing of PVC Pipe

Jointing of PVC pipe shall be accomplished as specified by the manufacturer and as follows:

- a. Clean spigot ends, grooves, and gaskets of all dirt and foreign materials, paying particular attention to the gasket groove.
- b. Set the gasket in the groove making sure the gasket is not twisted or turned to prevent proper seating.
- c. Lubricate the plain end of the pipe and gasket with lubricant as recommended by the manufacturer of the pipe.
- d. Push the plain end into the bell or coupling so that the mark on the plain end is in line with the end of the bell or coupling.

3.1.1.3 Cutting of Pipe

Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe.

3.1.1.3.1 PVC Pipe

Field cuts shall be made with a pipe cutter to assure a square end, but a conventional saw and a 90 degree miter box may be used when care is exercised. Field bevels shall be made with manual beveling tool.

3.1.1.4 Connections

Standard fittings are available for making connections to various types of pipe, either under pressure or in the dewatered condition. Where made under pressure, these connections shall be installed as approved. Connections between different types of pipe and accessories shall be made with transition fittings approved. Connection to the existing water distribution system shall be coordinated with West Grant Water System in accordance with paragraph 1.5. Contractor shall make arrangements with West Grant Water System for water supply required for testing, disinfection, and construction purposes.

3.1.1.5 Cross Connections and Interconnections

No piping shall be installed that will provide a cross connection or inter-connection between a distribution supply for drinking or domestic purposes and a polluted supply such as a waste pipe in such manner as to make possible backflow of polluted water into the water supply system.

3.1.1.6 Thrust Blocks

Plugs, caps, tees and bends deflecting 22-1/2 degrees or more, either vertically or horizontally, on waterlines shall be provided with thrust blocks. Thrust blocks shall be constructed of concrete as shown on the drawings. Thrust blocks shall be placed between solid ground and the fitting to be anchored. Unless otherwise indicated or erected, the base and thrust bearing sides of thrust blocks shall be poured directly against

undisturbed earth. The sides of thrust blocks, not subject to thrust, may be poured against forms. The area of bearing shall be as shown or as directed. Blocks shall be placed so that the fitting joints will be accessible for repair. Steel rods and clamps shall be protected by galvanizing.

3.1.7 Monuments

All changes in alinement and branch connections shall be located by a concrete water monument constructed as shown and placed as indicated on the drawings.

3.1.8 Underground Warning Tape

Three inch wide printed polyethylene warning tape with a metallic core shall be centered over all waterlines at a depth of 12 inches below finished grade to facilitate future location with a metal detector. The polyethylene shall be a blue color heavy gauge 0.004 inch thick film. Tapes shall be printed with a continuous two line message in bold black letters. Top line shall read "CAUTION . . ." and bottom line shall read "Water Line Buried Below." Underground warning tape shall be similar and equal to Catalog No. 2 WATT as manufactured by Seton Name Plate Corp., P.O. Drawer HB-1331; New Haven, CT 06505 (Phone (800) 243-6624). Installation shall conform to manufacturer's instructions.

3.1.9 Installation of Polyethylene Wrap

All underground ductile iron pipe, fittings, valves and tapping sleeves and valves shall be encased with the specified polyethylene wrap. The wrap shall be installed in accordance with the manufacturer's recommendations and AWWA C600. The wrap shall be secured to the pipe, fittings, etc. with the specified tape. All rips, tears or other damage shall be repaired with the adhesive tape.

3.1.10 Installation of Non-Corrosive Metallic Wire

The Contractor shall install a non-corrosive metallic wire directly over and on the center of all plastic water lines. This wire shall be carried through with the line in locations where short sections of ductile pipe is used. The wire shall be continuous on all mains and service lines and shall be connected to all fixtures and appurtenances. The locator wire shall be attached to the water mains and service lines with duct tape at 8 foot intervals. The wire shall be connected to all valves and shall be brought up through any valve boxes.

3.1.11 Installation of Wire Splice Kit

Splice caps as specified shall be installed over wire splices then be folded adjacent to the wire run and wrapped tightly with electrical tape as shown on the drawings.

3.1.12 Installation of Underground Valves and Valve Boxes

a. All valves and valve boxes shall be backfilled with 1/2 cubic yard of "red dirt" or "flume sand" as shown on the drawings.

b. The valve boxes shall have a concrete pad poured at the top of the box as detailed on the drawings and painted "safety blue".

3.1.13 Encased Waterline

Lines to be installed in Phase II shall be installed inside an encasement pipe. The encasement pipe shall be galvanized steel pipe, Grade A, conforming to the applicable requirements of API Spec 5L, welded in single or double lengths. Galvanized coating damaged during handling or welding shall be repaired by the application of either field applied sprayed or coated zinc or zinc-based solder and wire approved. The surface to be repaired shall be cleaned and prepared, and the repair material applied, as recommended by the manufacturer. The size of the encasement pipe shall be as shown in TABLE 1.

TABLE 1

CARRIER PIPE SIZE (NOMINAL DIAMETER, IN)	ENCASEMENT PIPE SIZE (NOMINAL DIAMETER, IN)	MAXIMUM SKID SUPPORT SPACING, FT
6	10	6.3

Encasement limits shall be as shown on the drawings. Depth of cover shall be sufficient to clear the concrete pressure pipe by at least 1 foot and in no instance shall the top of the encasement pipe be less than 2 and 1/2 feet below ground surface.

3.1.13.1 Carrier Pipe Installation

Carrier pipe and fittings shall be PE. Pipe joints and fittings located inside the encasement pipe shall be kept to a minimum. Prior to inserting the carrier pipe in the encasement pipe four wooden skids shall be steel-strap banded in placed at 90 degree axis points along the full length of the pipe, excluding the bell and spigot areas at both ends of the pipe. Skid leading edges shall be rounded and notches cut for the steel strapping so the assembled unit is smooth. The skid shall be of sufficient thickness to provide approximately 1-1/2 inches of clearance between the pipe bell and the invert of the encasement pipe. Maximum skid support spacing along the carrier pipe shall be as given under "Encased Waterline" in paragraph INSTALLATION. The bottom half of the encasement pipe shall be lubricated by pulling a large bundle of rags tied to a line saturated with pipe joint lubricant, back and forth through the encasement pipe. The pipe may be either pulled or pushed through the encasement pipe as described below. In either instance, the carrier pipe shall be installed a section at a time until a full string of carrier pipe is installed through the encasement pipe.

a. Pulling

- (1) Snake a cable with an eye on one end through the encasement pipe. Run the cable through a section of carrier pipe and insert the carrier pipe in the encasement pipe, leaving about 2 feet protruding.
- (2) Pull the cable through another section of carrier pipe and join the two sections of carrier pipe.
- (3) Place a 2 x 4 inch wooden block through the cable eye and across the end of the carrier pipe. Tie a tailing line to the cable so the cable can be pulled back through the pipe.
- (4) Pull the two sections of carrier pipe into the encasement

pipe. Leave the end of the carrier pipe protruding the encasement pipe. Join another section of carrier pipe. Re-set the 2 x 4 inch wooden block and cable eye and pull this section of carrier pipe into the encasement pipe. Continue until the carrier pipe is through the encasement pipe.

b. Pushing

Care shall be taken in pushing the carrier pipe to be sure the push is slow and uniform. The end of the carrier pipe being pushed shall be protected by the use of a 2 x 4 inch wooden block as in pulling.

3.1.13.2 Backfilling Carrier Pipe With Sand

After hydrostatic testing and approval, the space between the carrier pipe and the encasement pipe shall be backfilled with sand by flushing the sand into the space with a high pressure hose. The sand shall completely surround the carrier pipe and enclose it to, or near, the top of the carrier pipe. An excessive amount of water shall not be used which will cause the carrier pipe to float and damage the pipe or change its line or grade. Prior to installation of the sand, the carrier pipe shall be filled with water in order to positively eliminate the possibility of floating.

3.2 FIELD HYDROSTATIC AND LEAKAGE TESTS

a. The hydrostatic testing of all lines shall conform to the requirements of AWWA C600, Section 4, except as modified as follows:

- (1) Maximum allowable leakage shall not exceed 10 gallons per inch of the mains after the trench is backfilled.
- (2) The test shall be applied to the whole or individual valved off sections of the mains after the trench is backfilled.
- (3) Furnish gauges, water meter, water and all other material, tools, labor, equipment and other necessary assistance of conducting the tests. The West Grant Water District will be notified at least 48 hours in advance of the hydrostatic test. The West Grant Water District will be present at any or all tests.
- (4) The test pressure shall be 150 psi and shall be maintained for a minimum of four hours. The test pressure will be based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge.

b. Should the amount of leakage exceed that specified, locate and repair the defective joints until the leakage is within the specified limits.

3.3 DISINFECTION TEST, SAMPLING TAP, AND TEMPORARY LINE FLUSHING ASSEMBLY (CHLORINATION)

3.3.1 General

a. Assist in the collection of samples required for State Department of Health and Hospitals approval of the completed system by providing acceptable sampling taps and temporary line flushing assemblies, as required, and suitable for satisfactory chlorination and flushing of

the new line.

b. Upon receipt of notice of an acceptable bacteriological test from the State Department of Health and Hospitals, the chlorine sampling taps and any temporary line flushing assemblies shall be removed.

c. Temporary line flushing assemblies shall be adequately sized to allow flushing of the main at the velocity of no less than 2.5 feet per second.

d. The contractor is responsible for the successful disinfection of all water mains. Water shall not be furnished for consumer's use until water samples collected and analyzed by the local Health Department show the water to be free of coliform bacteria.

3.3.2 Disinfection Procedures

Disinfection shall be accomplished in conformance with the following.

3.3.2.1 Preliminary Flushing

The main shall be flushed, prior to chlorination, as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the pressure test has been made. It must be understood that flushing removes only lighter solids and cannot be relied upon to remove heavy material allowed to get into the main during laying. A tap should be provided large enough to develop a velocity in the main of at least 2.5 fps.

3.3.2.2 Form of Applied Chlorine

Any of the following methods of procedure (arranged in order of preference) shall be followed, subject to the approval of the Contracting Officer.

- a. Liquid chlorine gas-water mixture
- b. Direct chlorine feed
- c. Calcium or sodium hypochlorite and water mixture

3.3.2.3 Liquid Chlorine

A chlorine mixture shall be applied by means of a solution-feed chlorinating device in combination with a booster pump for injecting the chlorine-gas water mixture into the main to be disinfected. Chlorinating devices for feeding solution of the chlorine gas or the gas itself must provide means for preventing the backflow of water into the chlorine cylinder. Liquid chlorine shall be used only by personnel familiar with the proper use of the equipment and the emergency preparedness required with the use of the gas.

3.3.2.4 Chlorine-Bearing Compounds in Water

On approval of the Contracting Officer, a mixture of water and a chlorine-bearing compound of known chlorine content may be substituted for liquid chlorine.

3.3.2.5 Compounds to be Used

The chlorine-bearing compounds that may be used are:

- a. calcium hypochlorite granules

- b. sodium hypochlorite solutions
- c. calcium hypochlorite tablets

3.3.2.6 Preparation of Mixtures

The chlorine water solution is prepared by dissolving or mixing the tablets, granules or solution with water in the proportion required for the desired concentration. The following table give the amount of chlorine required for each 100 feet of pipe of various sizes for the 50 ppm chlorine dosage.

Pipe Size (Inches)	Volume of 100' Length (Gal)	Chlorine (lb)	1% Chlorine Water Solution (Gal)
4	65.3	0.027	0.33
6	146.5	0.061	0.73
8	261.0	0.108	1.30
10	408.0	0.170	2.04
12	588.7	0.240	2.88

3.3.2.7 Point of Application

The preferred point of application of the chlorinating agent is at the beginning of the pipeline extension or any valved section of it and through a corporation stop inserted in the top of the newly laid pipe. The water injector for delivering the chlorine-bearing water into the pipe should be supplied from a tap on the pressure side of the gate valve controlling the flow into the relocated waterline.

3.3.2.8 Rate of Application

Water from the existing distribution system or other source of supply shall be controlled so as to flow slowly into the newly laid relocated waterline during the application of chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall produce at least 50 ppm.

3.3.2.9 Preventing Reverse Flow

Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Check valves may be used if desired. Insure that a positive flow is developed in the direction of the new line before chlorinating. Insure that chlorine solution is not allowed to backfeed into the existing system thereby potentially creating a health and safety hazard for system users.

3.3.2.10 Retention Period

Treated water shall be retained in the pipe long enough to destroy a non-spore-forming bacteria. This period should be at least three hours and preferably longer as may be directed by the Contracting Officer.

3.3.2.11 Chlorinating Valves

In the process of chlorinating new laid pipe, all valves or other appurtenances shall be operated when the pipe line is filled with the chlorinating agent.

3.3.2.12 Residual Required

After the chlorine treated water has been retained for the required time, the chlorine residual at pipe extremities and at other representative points shall be at least 5 ppm.

3.3.2.13 Repetition of Procedure

Should the initial treatment fail to result in the conditions specified above, the original chlorination procedure shall be repeated until a 5 ppm residual is obtained.

-- End of Section --